

Differential Photoacoustic Particle Absorption Monitor, Phase I

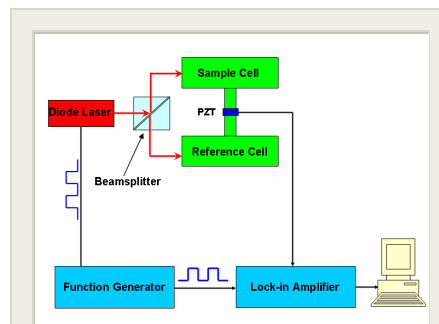
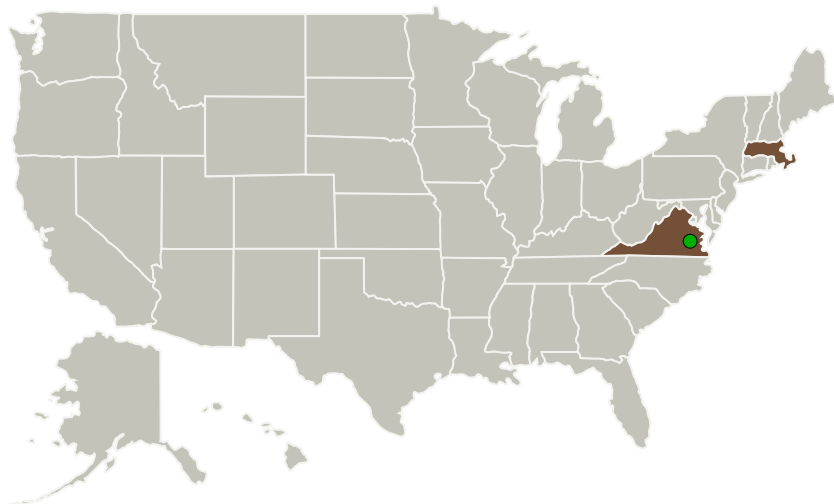
Completed Technology Project (2013 - 2013)



Project Introduction

We propose to develop a highly sensitive and compact monitor to measure light absorption from particulate matters. The fundamental of the proposed device is based on differential photoacoustic absorption spectroscopy (DPAS). It will be able to be remotely controlled and operated at high altitude. Background interference from NO₂ absorption and acoustic noise of aircraft engines will be significantly reduced due to a specific acoustic cell design. The Phase I project will provide a proof-of-concept demonstration. The ultimate goal of this study is to design and construct a portable PM absorption monitor for NASA's airborne measurement programs. The tasks of the proposal will include: 1) Construction of a laboratory prototype DPAS PM absorption monitor; 2) Development of an absorption calibration scheme; 3) Comparative study on optical absorption of laboratory soot particles with multi-angle absorption photometer (MAAP); and 4) Performance evaluation at a variety of sampling pressure. This SBIR Phase study will be performed by Aerodyne Research, Inc., in collaboration with United Technologies Research Center (UTRC). Both companies have been major participants in past NASA/FAA-sponsored aircraft emissions programs with extensive experiences in the study of PM optical absorption as well as soot formation and evolution in the atmosphere.

Primary U.S. Work Locations and Key Partners



Differential Photoacoustic Particle Absorption Monitor

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Organizations Performing Work	Role	Type	Location
Aerodyne Research, Inc	Lead Organization	Industry	Billerica, Massachusetts
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Massachusetts	Virginia

Project Transitions

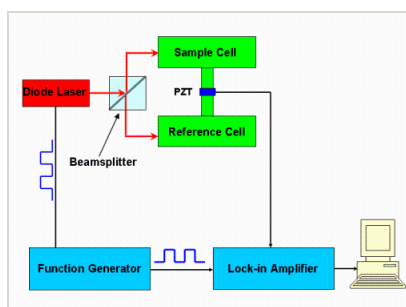
▶ **May 2013:** Project Start

✓ **November 2013:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140441>)

Images



Project Image

Differential Photoacoustic Particle Absorption Monitor
(<https://techport.nasa.gov/image/129273>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Aerodyne Research, Inc

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

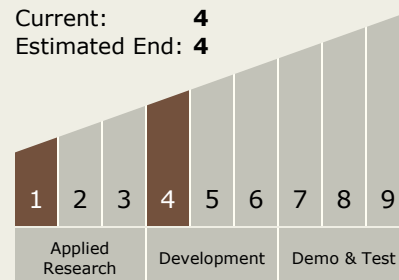
Carlos Torrez

Co-Investigator:

Zhenhong Yu

Technology Maturity (TRL)

Start: 1
Current: 4
Estimated End: 4



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Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.3 In-Situ Instruments and Sensors
 - └ TX08.3.4 Environment Sensors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System